Study of Hyperbaric Oxygen Therapy in Diabetic Patients with Foot Ulcers

Thesis

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Dedication

Words can not express my thanks, gratefulness, respect and love to **soul of my father** without his help, support, patience and encouragement, I would have never achieved any success.

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List of Abbreviations

Abb.	Meaning
ACCORD	Action to Control Cardiovascular Risk in Diabetes
ACE	Angiotensin-converting enzyme
ADA	American diabetes association
AGEs	Advanced glycosylated end products
ARBs	Antiotensin receptor blockers
ATA	Atmospheres absolute
BG	Blood glucose
BMI	Body mass index
CN	Charcot neuroarthropathy
CVD	Cardiovascular disease
DCCT	The diabetes control and Complications trial
DKA	Diabetic ketoacidosis
DM	Diabetes mellitus
DNA	Deoxyribonucleic acid
DR	Diabetic retinopathy
DSPN	Distal symmetric polyneuropathy
ELISA	Enzyme linked immunosorbent assay
ESRD	End stage renal disease
FDA	Food and drug administration
FPG	Fasting plasma glucose
FPG	Fasting plasma glucose
GDM	Gestational diabetes mellitus
GFR	Glomerular filtration rate
GTT	Glucose tolerance test
HbA1c	Glycated hemoglobin
HBOT	Hyperbaric oxygen therapy
IDDM	Insulin-dependent diabetes mellitus
IFG	Impaired fasting glucose
IGT	Impaired glucose tolerance
ITT	Insulin tolerance test
IV	Intravenous
Kpa	Kilopascal

Abb.	Meaning
LOPS	Loss of protective sensation
MODY	Maturity onset diabetes of the young
NPWT	Negative pressure wound therapy
OGTT	Oral glucose tolerance test
OGTT	Oral glucose tolerance test
PAD	Peripheral arterial disease
PN	Polyneuropathy
PO2	Partial pressure of oxygen
RCW	Removable Cast Walkers
SMBG	Self monitoring blood glucose
SOD	Superoxide dismutase
TCC	Total Contact Cast
UHMS	Undersea and Hyperbaric Oxygen Society
UKPDS	Prospective Diabetes Study
VEGF	Vascular endothelial growth factor
VEGF	Vascular endothelial growth factor
VPT	Vibmration perception threshold
WHO	World health organization

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Introduction

INTRODUCTION

Diabetes is a metabolic disorder of multiple causes characterized by chronic hyperglycemia and disorders of carbohydrate, fat, and protein metabolism **(Ambler , 2006)**. The chronic hyperglycemic state is associated with long term damage, dysfunction, and failure of various organs especially the eyes, kidneys, nerves, heart and blood vessels **(ADA, 2007)**. Diabetic foot ulcer is a major complication of diabetes mellitus, and probably the major component of the diabetic foot **(ADA, 2009).** It occurs in 15% of all patients with diabetes and precedes 84% of all lower leg amputations. Major increase in mortality among diabetic patients, observed over the past 20 years is considered to be due to the development of macro and micro vascular complications, including failure of the wound healing **(Brem, 2007).** The development of lower extremity ulcer is a well known potential complication for patients with diabetes **(ADA, 2009).** There are three main factors involved in the pathology of the diabetic foot; neuropathy, ischemia and infection. The relative role played by each element can vary **(Inlow, 2000).** In spite of adequate pulses and large vessel perfusion, some diabetic patients still develop wounds that appear to be hypoxic/ischemic and fail to heal. There are also

functional abnormalities of the microcirculatory system in diabetic patients that may impair local blood flow and oxygen delivery, thus delaying wound healing **(Ong, 2008)**. Hypoxia can cause amputation. Hyperbaric oxygen increase the amount of oxygen dissolved in plasma, allowing tissues to achieve better levels of oxygenation **(ADA,2001)**.

Hyperbaric oxygen therapy (HBOT) involves the inhalation of 100 percent oxygen at pressures 2 or 3 times greater than atmospheric pressure at sea level **(UHMS, 2002)**. One of the most common indications for HBOT is to aid healing of diabetic foot wounds **(Ong, 2008)**. Hyperbaric oxygen therapy has been suggested to improve oxygen supply to wounds and therefore improve their healing **(Kranke, 2012)**. Hyperbaric oxygen therapy is conjunction with aggressive multidisciplinary therapeutic protocol is effective in decreasing major amputation in diabetic patients with foot ulcer **(Milano, 2000)**.

Aim of the Work